U.S. Department of Transportation
Federal Aviation Administration

Subject:	INFORMATION: Interim Summary of Policy and Advisory Material Available for Use Cabin to Flight Deck Alerting Systems on Title In the Certification of Airplane 14 CFR Part 25 Aircraft	Date:	Original Release: October 22, 2001 Revised: October 29, 2001
From:	Manager, Airplane and Flight Crew Interface Branch, ANM-111	Reply to: Attn. Of:	01-111-197 Forrest Keller ANM-111(425) 227-2790
To:	SEE DISTRIBUTION		

1.BACKGROUND/PURPOSE

As excerpted from the Report of the Secretary's on Aircraft Security, October 1, 2001:

The threat to aviation safety has changed, and so must our response. The events of September 11 changed forever our concepts of appropriate aviation safety. The use of a hijacked aircraft as a weapon requires a new strategy to ensure that the crew always retains control of the aircraft. To combat the new threat and restore public confidence in commercial aviation, this report documents our consideration of changes to aircraft design and operation. Augmented by the suggestions and recommendations received from all sources, one or more of the following goals *1) to deter the hijack plan, making it too difficult, expensive or undesirable to use aviation as weapon of terror; 2) to deny access to the flight deck by any threat; 3) to delay access to the flight deck, allowing the crew time to take protective measures; 4) and to recover control through aggressive crew response*.

Recommendation 5: We recommend that these flight deck procedural changes be made at all airlines within 30 days

.....With the flight deck no longer readily accessible to flight attendants, they must have a method for immediate notification to the flight deck during a suspected threat in the cabin. On receipt of such a warning, the pilot would check to make sure that the flight deck door is secure and begin immediate landing procedures. Consideration should be given to systems that might be installed in the aircraft as well as a device that could be carried by a crewmember. In those aircraft equipped with an automated evacuation alarm system, it may in the near term be an effective tool for such notification.

In response to the Secretary's Rapid Response Team goals and the specific recommendation noted above, this memorandum provides a summary of policy and advisory material that should be applied when certifying the subject system. Aircraft Certification Offices (ACO) should apply the policy and advisory material summarized in this memorandum to such new and amended type certificate and supplemental type certificate programs immediately. This memorandum will ensure a standardized approach in certification independent of ACO or Designated Alteration Station geographical location. This memorandum may be revised as the need arises.

At this time three methods are envisioned for addressing the Rapid Response Team recommendation described above. A new 'hard wired' panic button type system is one method envisioned. Another includes

a wireless device carried by the cabin crew. The third is some combination of "hard wired" and "wireless" alerting schemes. The certification issues associated with these three methods are addressed below. Per Rapid Response team recommendation 5, the issues and guidance outlined below are based on the assumption that the alerting system is supplementary to a hardened crew compartment door.

There is also thought of using the cabin communication system already present in many transport airplanes as a method of addressing Rapid Response Team recommendation 5. Use of an already approved system in this manner is an operational issue and not addressed in this memorandum. There has also been suggestions for use of wireless transmitters and wireless receivers, not connected to airplane power or other airplane systems, or permanently installed on the airplane. This implementation is also an operational issue and, again, not addressed here.

2. SYSTEM CERTIFICATION ISSUES

Though not entirely applicable or comprehensive for cabin/flight deck alerting systems, Advisory Circular (AC) No. 25-10, Guidance *for Installation of Miscellaneous, Non-required Electrical Equipment*, can be used as basic guidance for certifying such systems.

a) In accordance with § 25.1301, the cabin/flight deck alerting system must be of a kind and design appropriate to its intended function, and must function properly when installed. The keywords to understand the intent of this regulation are "appropriate" and "properly," as they relate to airworthiness. To be "appropriate" means that the equipment is intended for use in a manner for which it was designed. To function "properly" means that the cabin/flight deck alerting system cannot result in an inability of the airplane and/or flight crew to continue safe flight and landing, nor can failures or malfunctions of the system introduce such hazards.

Further, compliance with certain operational rules is considered inherently a part of the "intended function" aspect of § 25.1301 for many systems. Compliance to any applicable operational rules should be addressed during certification.

b) §25.1309(b) & (c): The effect on flight crew operations of a failure or malfunction of the cabin/flight deck alerting system must be assessed. The system must be shown to have sufficient functional integrity that it can reasonably be expected to function properly during an event that would necessitate its use. As a minimum, the system should incorporate protective measures to prevent inadvertent operation. Also, a system malfunction resulting in a nuisance alert must be shown to be improbable unless the effect on the flight crew is mitigated in some manner.

c) The function of required instrument systems must not be compromised by the installation of the cabin/flight deck alerting system (reference § 25.1333(c)).

3. ELECTRICAL INSTALLATION ISSUES ASSOCIATED WITH EMERGENCY CABIN/FLIGHT DECK ALERTING SYSTEMS

AC 25-16, *Electrical Fault and Fire Prevention and Protection*, provides direct guidance for electrical system aspects of compliance for such systems. Some of the key points contained in this AC, as well specific issues associated with compliance with the rules governing airborne electrical equipment are :

a) The cabin/flight deck alerting system components and wiring should meet the flammability requirements of § 25.853 and § 25.869. ”Earlier" wire (as defined in AC 25-16, e.g., PVC coated wire) may not be used unless it is part of the original type basis for the airplane.

b) Cabin/flight deck alerting system wiring should be installed in accordance with the wiring standards established by the original airplane manufacturer or those that reflect the best industry airplane wiring practices.

c) An electrical load analysis, based on the most recent electrical load configuration for the airplane, should be accomplished in accordance with § 25.1351(a).

d) Cabin/flight deck alerting system wiring should be protected by appropriately rated and coordinated circuit breakers in accordance with § 25.1357.

e) Existing airplane system separation provisions should not be compromised by the installation of the system (reference § 25.1353(a)).

f) In most cases, laboratory, ground, and flight testing for electromagnetic interference (EMI)should be accomplished. The scope and rigor of EMI testing necessary will increase with the introduction of wireless technology in the cabin/flight deck alerting system. Since, systems not operationally necessary are usually inhibited during takeoff and landing to preclude the possibility of electromagnetic interference, the scope and rigor of EMI testing necessary will further increase should the system remain active during approach and landing.

4. FLIGHT DECK HUMAN FACTORS ISSUES ASSOCIATED WITH INSTALLATION CABIN/FLIGHT DECK ALERTING SYSTEMS

AC 25-7A, *Flight Test Guide for Transport Airplanes*, provides guidance on the flight test and human factors evaluation of alerting systems. Some of the key points contained in this AC; as well specific issues associated with rule compliance are outlined below:

There are two categories of installations to be considered:

a) Stand-alone Systems

The first category is an independent alerting system that is not integrated with existing, approved airplane warning systems or displays.

Issues associated with stand-alone installations:

i) §25.771(a): Each pilot compartment and its equipment must allow the minimum flight crew(established under §25.1523) to perform their duties without unreasonable concentration or fatigue.

ii) §25.773(a)(2): When activated, lights or displays associated with the cabin/flight deck alerting system should not produce unacceptable glare or reflections on the existing essential/critical displays or on the flight deck windows, under expected lighting conditions.

iii) §25.777(a): Controls for the system must be accessible by both crewmembers and not be placed such that operation could cause inadvertent operation of other controls.

iv) §25.1322(a): If a light is used in the alerting scheme the color should correspond to the level of expected crew action associated with the alert, i.e., hazard alert lights requiring immediate crew action should be red. When activated the alerting system should not interfere with or circumvent warnings and alerts associated with the condition or operation of the airplane.

v) §25.1523: The use of the system, in accordance with the proposed operating procedures, should not result in pilot distraction or workload that may unacceptably compromise pilot performance of other required tasks. Further, if an audible alarm is used, provisions must be provided for the crew to silence the alarm.

b) Integrated Systems

Systems in which the cabin/flight deck alerting system is interconnected to existing, approved, warning system systems and/or essential/critical displays (e.g., main panel displays, FMS control/display units, etc.).

The issues associated with stand-alone installations above may be applicable entirely or in some part to integrated systems. In addition the following issues should be considered.

i) §25.1301(a) The cabin/flight deck alerting system must not interfere with the intended function and use of other essential/critical functions associated with any interconnected system.

ii) §25.777(a), §25.1555(a): Integration of the cabin/flight deck alerting system controls, lights, and/or displays should not result in confusion in the labeling or operation of other required systems(e.g., the nomenclature of control functions should not be similar to existing nomenclature to the extent that confusion could result).

Questions regarding this memorandum should be directed to Mr. Forrest Keller of the Airplane and Flight Crew Interface Branch, ANM-111. Mr. Keller's telephone number is (425) 227-2790 and his e-mail address is Forrest.Keller@faa.gov.

Charles Huber

DISTRIBUTION

All Managers, Aircraft Certification Offices
Manager, Aircraft Engineering Division, AIR-100
Manager, Transport Standards Staff, ANM-110
Manager, Standardization Branch, ANM-113
Manager, International Branch, ANM-116
Manager, SEA-AEG
Manager, LGB-AE